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BULLETIN
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Notes on the Winter Flora of Bermuda.

By J. F. Kemp.

The Bermuda Islands consist of a group situated off the coast of the United States in N. Lat. 32° 14′ 45″, W. Long. 64° 40′ 55″. They are thus on nearly the same parallel of latitude as Charleston, S. C., and the same meridian as Halifax, N. S. As a British military and naval station they are of importance disproportionate to their small extent. Geologically, the formation is a coral island of the atoll type, but the portions above water, and indeed almost all the visible and investigated portions below water, are chiefly of Æolian origin, and have evidently been heaped up precisely as the peninsula of Florida has been pushed seaward. The inhabitable part is entirely on the south and south-western side of the ring, an evident consequence of the prevailing south-west winds. In addition to the more common and extensive soft sand-rock, which is evidently of very recent formation, there is a narrow ridge of hard, almost crystalline limestone, which is not fossiliferous, which appears to be older than the remainder and to have undergone some metamorphic action. It is honeycombed with caves, and bears the most interesting part of the insular flora and the larger portion of those plants which seem to have been introduced by natural as distinguished from artificial means.*

The general aspect of the country is similar to the rolling sand-dunes of Long Island, except that they are worn into perpendicular cliffs along the shore in many places. The coral sand becomes cemented on exposure into a compact rock, contrasting in this respect very strongly with the silicious beaches familiar to us. Above the water line the exposed faces of the cliffs exhibit the stratified structure due to their origin, but, below it, from some influence of the water, they are apparently massive. In the little bays which indent the coast are stretches of beach sand of a rich creamy color, which support a scrubby growth of shrubs back from the water line. The most important chemical constituents of this sand are shown in the first analysis below. It has doubtless been the source of the other soil whose composition is shown in the second, third and fourth analyses. This fills the hollows back from the shore, is of a red color, supports the market gardens, and is the great source of wealth to the inhabitants. It has evidently resulted from the leaching of the coral sand by rains, the soluble lime being removed and the less soluble constituents concentrated.

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* Cf. Bulletin 25, U. S. Nat'l. Museum. List of Plants by Governor Lefroy.

	Coral Sand.	Red Soil.	Red Soil.	Red Soil.
Organic matter	3.806.	11.210.	13.00.	14.910.
SiO_2 and sand insol. in HCl	0.050.	40.127.	31.764.	20.134.
Fe_2O_3	0.050.	12.340.	10.000.	28.54.
Al_2O_3		13.75.	7.35.	22.90.
CaO	52.470.	3.508.	7.84.	3.335.

The omitted components are water, alkalies, magnesia, etc.

As might be expected from their insular position, they need nitrogenous fertilizers, and the gulf-weed which is washed ashore is carefully gathered to supply the deficiency.

The islands are on the eastern edge of the Gulf Stream, by which very naturally the climate is much influenced. The surface temperature of the water averages 70° F. For the last ten years the mean temperature of the air has been 71° F., the dew-point being 64° F. The highest observation in the shade is 90° F., lowest, 48° F., but in the sun the mercury has reached 158°. August is the hottest month, averaging 87°; February the coldest at 55°. The daily range is 6°–8°, annual 32°. During my visit, March 8th to April 2d, it was 60°–65°. To compare with the United States, it may be said that the isothermal of 72° runs across the middle of Florida at Tampa, and, crossing the upper part of the Gulf of Mexico, strikes Texas at Corpus Christi. The rain-fall is large. The average of ten years shows 155 rainy days in 365, and 56 inches. In one 24 hours while I was there over 4 inches fell. But the distribution through the year is very uniform, the wettest and dryest months differing only by 1″.5. By way of comparison, the rain-fall of New York is 40, and so high a rain-fall as this is reached only in the everglades of Florida, about the Mississippi Delta and on the far north-west coast. It would seem therefore that in physical features the islands closely resemble Southern Florida. Bermuda is best known in the " States " by reason of the early vegetables that come hither. Onions and potatoes are the most important, but tomatoes, beets and carrots are raised in abundance. Strange to say, the seed-onions and potatoes come entirely from abroad, as those produced on the islands do not afford palatable vegetables. The seed-onions come from Madeira and Teneriffe, the potatoes from the States. Carrots are much used locally as table-vegetables, and, when boiled, are exceedingly sweet and palatable, lacking entirely the strong taste that in the north makes them best adapted for fodder. Corn is raised in season and is said to be very good. Tomatoes were ripe March 1st, if not earlier. As if to compensate for natural advantages, the vegetables are much exposed to blights of various sorts, the potatoes suffering especially. But notwithstanding these and the small acreage the exports in 1882 were valued at over £80,000, and the amount is probably greater at present.

Of fruits, the chief one that was ripe in March was the banana. The dwarf variety (*Musa Cavendishii*) is most abundant. Oranges are less cultivated than in former years, but are said to be of unusual excellence. The Bermuda lemon has an exceedingly thick rind, but the juice is very palatable. Peaches formerly abounded, but have of late been destroyed by an insect. The few trees that I noticed seemed strong, but the fruit, I was told, is invariably destroyed at the core by this pest. Apples and the allied fruits run to wood. Loquots and the avocado pear are abundant. Every garden is provided with several papaw-trees (*Carica papaya*) the clusters of fruit of which, with the tuft of leaves at the summit of a naked trunk, strike a stranger very forcibly. I heard of the recent introduction of grapes, but did not learn with what success.

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* Cf. Voyage of the Challenger. Vol. I., p.

Strawberries were ripe in March and were very good. Gooseberries, I was told, do well, but that other berries run to wood.

Of trees the most common, useful and noticeable is the Bermuda cedar (*Juniperus Bermudiensis*), which in former times covered the island and was an abundant source of timber for vessels. It is everywhere present now, but probably of smaller size, the larger trees having been cut for timber. The only other noticeable tree growing wild is the palmetto (*Sabal umbraculifera*), which standing, as it does, side by side with the cedar, gives the landscape a curiously mixed character, tropical and temperate zones seeming to be intermingled.

In addition to these, which were probably introduced by natural means, there are trees from all parts of the world. In former years the inhabitants were seafaring, and on their voyages brought back many trees that struck their fancy. These are scattered over the island in gardens and on lawns. There are several screw-pines, making with the cedar the only conifers proper growing on the island. The cocoa-nut palm is not uncommon, and the cabbage palm (*Oreodoxa oleracea*) has four magnificent representatives at the head of Hamilton Harbor. The trunks rise fifty feet or more and are about seven feet in circumference five feet above the base. Of the India-rubber tree, a magnificent specimen is one of the first things met by the visitor on landing. The calabash (*Crescentia Cujete*) is not uncommon. It supplies the colored people with many useful utensils. I saw one mahogany-tree, and, in a cool, moist dell, several coffee-trees. The true mangrove (*Rhizophora Mangle*) and the false mangrove (*Avicennia nitida*) fill the swamps and lagoons with their trunks and clustered roots. The oleander is very abundant, forming the common hedge. It is of great value in holding together the shifting sand, for it grows everywhere, even on the least promising dunes. The sago palm (*Cycas revoluta*) is a common ornament of the lawns. Though not properly to be mentioned with the trees, the century-plant is met with everywhere, and not infrequently I saw it in blossom or in fruit. The Spanish bayonet (*Yucca aloifolia*) is often used for hedges.

Governor Lefroy, in a list of plants published in Bulletin No. 25, U. S. Nat'l Museum, distinguishes about 150 species as introduced by natural means. He also gives a very full and interesting list of artificially introduced species and of others which refused to thrive. There is also a list locally published, prepared by Mr. Oswald A. Reade, a pharmaceutical chemist formerly stationed at the dock yard.

The following plants were collected between March 8th and April 2nd. Unless otherwise mentioned they were then in flower. Dr. N. L. Britton kindly aided in the preparation of the list of phanerogams and Miss E. G. Knight identified the ferns.

LIST OF BERMUDA PLANTS.—Collected March, 1885, and deposited in the Herbarium of Columbia College.

Ranunculus parviflorus, L.
Ranunculus muricatus, L.
Argemone Mexicana, L.
Papaver dubium, L.
Fumaria densiflora, DC.
Raphanus sativus, L.
Alyssum maritimum, L.
Cakile maritima, Scop., var. *æqualis*, Chapm.
Cerastium viscosum, L.
(*Stellaria media*, Smith.)[*]
Sida carpinifolia, L.
Oxalis corniculata, L.
Geranium Carolinianun, L.
(*Medicago denticulata*, Willd.)
Medicago lupulina, L.
Melilotus officinalis, Willd.
Œnothera rosea, Ait.
Bryophyllum calycinum, Sals.
(*Opuntia vulgaris*, Mill. In fruit.)
Smyrnium olusatrum, L.
Spermacoce tenuior, Lam.
Sherardia arvensis, L.
Solidago sempervirens, Ait.
Bidens leucantha, Willd.
Cichorium Intybus, L.
(*Taraxacum officinale*, Weber.)
(*Plantago major*, L.)
(*Plantago lanceolata*, L.
Anagallis arvensis, L.
Erythræa Centaurium, Pers.
Nerium Oleander, L.
Asclepias curassavica, L.
Ipomœa Nil, Rth.
Dichondra repens, Forst.
(*Nicotiana Tabacum*, L.)
(*Tournefortia gnaphalodes*, R.Br.)
Salvia coccinea, L.
Stachys arvensis, L.
Stachytarpha Jamaicensis, V.
Lippia nodiflora, Rich.
Lantana crocea, Jacq.
Lantana odorata, L.
Avicennia nitida, Jacq. In fruit.
Veronica arvensis, L.
(*Rumex crispus*, L.)
Euphorbia Peplus, L.
Euphorbia buxifolia, Lam.
(*Urtica urens*, L.)
Aloe vulgaris, L.
Richardia Æthiopica, L.
Commelina nudiflora, L.
Stenotaphrum Americanum, Schrank.
Chloris petraca, Thurb.
Oplismenus setarius, Spreng.
Dichromena leucocephala, Michx,
Scirpus validus, Vahl.
Asplenium myriophyllum, Presl.
Asplenium Magellanicum, Kaulf.
Asplenium parvulum, M. & G.
Adiantum cuneatum, Lang. & Fisch.
Aspidium patens, Swartz.
Nephrolepis exaltata, Schott.

Note on Veronica Anagallis, L.

By N. L. BRITTON.

In the latter part of September, 1883, while botanizing near the village of Mahwah, Bergen Co., New Jersey, I noticed in a small stream which crosses the N. Y. L. E. & W. R. R., half a mile or so north of the station, a very strong and abundant growth of a *Veronica*, whose broad, obtuse, nearly sessile, slightly serrate leaves, and nearly erect habit seemed peculiar, and different from any form with which

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[*] Plants in parenthesis were noticed but not collected.